

WHAT IS CLAIMED IS:

1. An active matrix type display device, comprising:

a plurality of gate lines;

5 a plurality of data lines crossing said plurality of gate lines;

a plurality of pixel electrodes;

a thin film transistor disposed at each intersection between said plurality of gate lines and said plurality of data lines, and

10 including a gate electrode and an active region, said gate electrode being connected to one of said plurality of gate lines, and said active region having a first region connected to one of said plurality of data lines and a second region connected to a corresponding one of said plurality of pixel electrodes; and

15 a gate line driver for sequentially applying a gate selection signal with a pulse-shaped voltage waveform to a selected one of said plurality of gate lines; wherein

said gate line driver causes a falling edge of said gate selection signal with said pulse-shaped voltage waveform to be
20 smoother than a rising edge thereof.

2. The active matrix type display device according to claim

1, wherein said gate selection signal requires at least a time $t/2$ to fall, where t is the time from when a first gate line assumes
25 an unselected state to when subsequent second gate line assumes a selected state.

3. The active matrix type display device according to claim 1, wherein said gate selection signal falls over a time at least ten times the time required for the signal to rise.

5 4. The active matrix type display device according to claim 1, wherein

said gate line driver includes a gate buffer provided at a final stage and connected to a corresponding one of said plurality of gate lines,

10 said gate buffer includes a transistor having first and second regions of an active layer respectively connected to the ground and to said corresponding gate line, and

the condition, $2.5(R1+R2)*(C1+C2) < t < 5(R1+R2)*(C1+C2)$, is satisfied, wherein

15 R1 represents a total resistance of said gate line and the gate electrodes of the thin film transistors connected to said gate line in a pixel region,

20 C1 represents a total capacitance of capacitors connected to said gate line in the pixel region and having said gate line as one electrode,

R2 represents a channel resistance of the transistor in said gate buffer,

25 C2 represents a capacitance of a capacitor formed by said active layer of the transistor in said gate buffer and the gate electrode of said transistor, and

t represents a flyback period in a horizontal scanning period.

5. The active matrix type display device according to claim 4, wherein a channel length L and a channel width W of the transistor in said gate buffer satisfy the condition $W/L < 1$.

6. The active matrix type display device according to claim 1, wherein

said gate line driver includes a gate buffer provided at a final stage and connected to a corresponding one of said plurality of gate lines,

said gate buffer includes a transistor having first and second regions of an active layer respectively connected to the ground and to said corresponding gate line, and

a channel length L and a channel width W of the transistor in said gate buffer satisfy the condition $W/L < 1$.

7. The active matrix type display device according to claim 1, wherein

said gate line driver includes a gate buffer provided at a final stage and connected to a corresponding one of said plurality of gate lines,

said gate buffer includes a current supplying transistor having first and second regions of an active layer connected between a power source and said corresponding gate line, and a current discharging transistor having first and second regions of an active layer respectively connected to the ground and to said corresponding gate line, and

the ratio (channel width W)/(channel length L) of said current

supplying transistor differs from the ratio (channel width W)/(channel length L) of said current discharging transistor.

8. The active matrix type display device according claim 7,

5 wherein

the condition, $2.5(R1+R2)*(C1+C2) < t < 5(R1+R2)*(C1+C2)$, is satisfied, wherein

R1 represents a total resistance of said gate line and the gate electrodes of the thin film transistors connected to said gate line in a pixel region,

C1 represents a total capacitance of capacitors connected to said gate line in the pixel region and having said gate line as one electrode,

R2 represents a channel resistance of the current discharging transistor in said gate buffer,

C2 represents a capacitance of a capacitor formed by said active layer of the current discharging transistor in said gate buffer and the gate electrode thereof, and

t represents a flyback period in a horizontal scanning period.

9. The active matrix type display device according to claim 8, wherein the channel length L and the channel width W of the current discharging transistor in said gate buffer satisfy the condition $W/L < 1$.

10. The active matrix type display device according to claim 8, wherein the condition that the ratio of (the ratio W/L of said

current supplying transistor) / (the ratio W/L of said current discharging transistor) is greater than 1 is satisfied.

11. The active matrix type display device according to claim 5 8, wherein the condition that the ratio of (the ratio W/L of said current supplying transistor) / (the ratio W/L of said current discharging transistor) is greater than 5 is satisfied.

12. An active matrix type display device, comprising:
10 a plurality of gate lines;
a plurality of data lines crossing said plurality of gate lines;

a plurality of pixel electrodes;
15 a thin film transistor disposed at each intersection between said plurality of gate lines and said plurality of data lines, and including a gate electrode and an active region, said gate electrode being connected to one of said plurality of gate lines, and said active region having a first region connected to one of said plurality of data lines and a second region connected to a
20 corresponding one of said plurality of pixel electrodes; and

a gate line driver for sequentially applying a gate selection signal with a pulse-shaped voltage waveform to a selected one of said plurality of gate lines; wherein

said gate line driver causes a falling time of said gate
25 selection signal to be longer than a rising time thereof.

13. The active matrix type display device according to claim

12, wherein said gate selection signal requires at least a time $t/2$ to fall, where t is a time from when a first gate line assumes an unselected state to when a subsequent second gate line assumes a selected state.

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14. The active matrix type display device according to claim 12, wherein said gate selection signal falls over a time at least ten times the time required for the signal to rise.

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15. The active matrix type display device according to claim 12, wherein

said gate line driver includes a gate buffer provided at a final stage and connected to a corresponding one of said plurality of gate lines,

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said gate buffer includes a transistor having first and second regions of an active layer respectively connected to the ground and to said corresponding gate line, and

the condition, $2.5(R1+R2)*(C1+C2) < t < 5(R1+R2)*(C1+C2)$, is satisfied, wherein

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$R1$ represents a total resistance of said gate line and the gate electrodes of the thin film transistors connected to said gate line in a pixel region,

$C1$ represents a total capacitance of capacitors connected to said gate line in the pixel region and having said gate line as one electrode,

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$R2$ represents a channel resistance of the transistor in said gate buffer,

C2 represents a capacitance of a capacitor formed by said active layer of the transistor in said gate buffer and the gate electrode of said transistor, and

t represents a flyback period in a horizontal scanning period.

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16. The active matrix type display device according to claim 15, wherein a channel length L and a channel width W of the transistor in said gate buffer satisfy the condition $W/L < 1$.

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17. The active matrix type display device according to claim 12, wherein

said gate line driver includes a gate buffer provided at a final stage and connected to a corresponding one of said plurality of gate lines,

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said gate buffer includes a transistor having first and second regions of an active layer respectively connected to the ground and to said corresponding gate line, and

a channel length L and a channel width W of the transistor in said gate buffer satisfy the condition $W/L < 1$.

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18. The active matrix type display device according to claim 12, wherein

said gate line driver includes a gate buffer provided at a final stage and connected to a corresponding one of said plurality of gate lines,

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said gate buffer includes a current supplying transistor having first and second regions of an active layer connected

between a power source and said corresponding gate line, and a current discharging transistor having first and second regions of an active layer respectively connected to the ground and to said corresponding gate line, and

5 the ratio (channel width W)/(channel length L) of said current supplying transistor differs from the ratio (channel width W)/(channel length L) of said current discharging transistor.

10 19. The active matrix type display device according to claim 18, wherein

the condition, $2.5(R1+R2)*(C1+C2) < t < 5(R1+R2)*(C1+C2)$, is satisfied, wherein

15 R1 represents a total resistance of said gate line and the gate electrodes of the thin film transistors connected to said gate line in a pixel region,

C1 represents a total capacitance of capacitors connected to said gate line in the pixel region and having said gate line as one electrode,

20 R2 represents a channel resistance of the current discharging transistor in said gate buffer,

C2 represents a capacitance of a capacitor formed by said active layer of the current discharging transistor in said gate buffer and the gate electrode thereof, and

25 t represents a flyback period in a horizontal scanning period.

20. The active matrix type display device according to claim 18, wherein the channel length L and the channel width W of the

current discharging transistor in said gate buffer satisfy the condition $W/L < 1$.

21. The active matrix type display device according to claim
5 18, wherein the condition that the ratio of (the ratio W/L of said current supplying transistor) / (the ratio W/L of said current discharging transistor) is greater than 1 is satisfied.

22. The active matrix type display device according to claim
10 18, wherein the condition that the ratio of (the ratio W/L of said current supplying transistor) / (the ratio W/L of said current discharging transistor) is greater than 5 is satisfied.